Should the United States support the development of more biotechnology to genetically modify food?

GETTING ORIENTED

The weekly passage mentions issues related to genetically modified foods. Here is some information that might be helpful to students less familiar the topic.

Genetic Modification and Biotechnology

Although genetic modification and biotechnology are commonly used interchangeably or to mean the same thing, genetic modification is a special set of technologies that change the genetic structure of organisms, including plants, animals and bacteria. Genetically modified foods are typically plants that have had genes transplanted or moved into them. The most common plant products that are genetically modified are soybeans, corn, canola, rice and cottonseed oil. The transplanted genes allow faster growth, resistance to germs that cause disease, production of extra nutrients, and other benefits.

Undernourishment and Malnutrition

At the beginning of 2009 the world was officially estimated to have 963 million malnourished people. Malnutrition happens when people have limited access to nutritious foods for health and growth. Nearly 2/3 of the hungry people live in Asia. Many problems cause malnutrition. In some cases, people just do not have enough to eat, but a principal cause of malnutrition is poor hygiene and sanitation conditions. Many people don't have access to bathrooms and clean drinking water. In Asian countries the increased production of spirulina, a food supplement that contains a great quantity of protein, is another way that world hunger is being combatted.

United States Food and Drug Administration (FDA)

The United States Food and Drug Administration (FDA) is an agency of the United States Government. The FDA is responsible for protecting and promoting public health. The Center for Food Safety and Applied Nutrition is the branch of the FDA that is responsible for ensuring the safety and accurate labeling of nearly all food products in the United States. When dealing with genetically modified foods, the FDA considers the safety of the final product as well as the techniques used to create it. Although study of the final product tells whether or not a product is safe to eat, knowing the techniques used to create the product helps in understanding what questions to ask in reviewing the product's safety. That is the way FDA regulates both traditional food products and products made through biotechnology.

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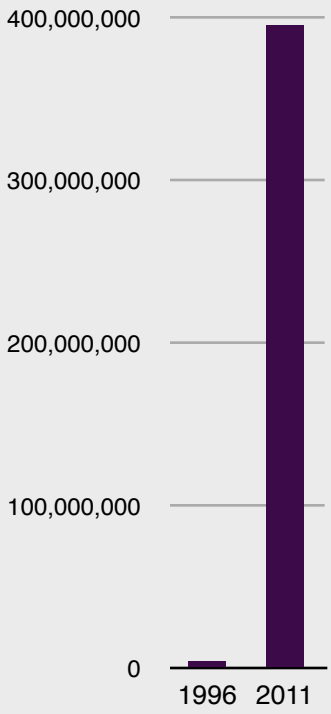
EVIDENCE AND PERSPECTIVES

	Some may have this view:	*But others may think:*
General Public	People want to know that the food they are eating is safe to eat. Most people are comfortable eating genetically modified foods if they feel sure that the FDA has approved them. They realize that costs of food will be lower if there is less risk of insects destroying plants. They believe that if these kinds of biotechnologies will help the starving people then that is a good thing.	Some people want to know for sure that food is labeled clearly to inform the general public what they are eating. They have read that no one is certain at this time what the results will be if people eat genetically modified food. Some people have allergies to all kinds of things, and they want to be able to look at labels and know that the ingredients do not include the things they are allergic to. They want more answers before they can feel comfortable about eating genetically modified foods.
Research Scientists	Research scientists, in this case genetic engineers, have spent many years and much government money finding ways to produce genetically modified products. They have studied and experimented for many years to develop the ability to create genetically modified foods and ingredients. They feel confident that these foods are as healthy to eat as food that does not have genetic modifications. They also see their work as a way of reducing world hunger.	Research scientists who have any doubt about genetically modified foods keep working to find new and improved methods of working with plants and genes.
Business Owners and Investors	Some farmers believe that they can no longer make a living as a farmer without growing genetically modified foods. Some farmers only grow corn or soybeans because they know that they can sell a lot of these two crops since they are used to make other foods.	Some farmers want to grow crops that are not genetically modified. They fear that farms that only grow genetically modified corn and soybeans will make it impossible for them to compete. They believe that food should be natural but growing food in this way is more expensive and requires more work.



- Scientists first discovered that DNA can transfer between organisms in 1946.
- In 1994, the tomato was genetically modified for human consumption. This genetic modification allowed the tomato to delay ripening after picking.
- Argentina, Brazil, Canada and India produce significant amounts of genetically modified crops.
- In 2011, 29 countries worldwide grew genetically modified crops by approximately 16.7 million farmers.
- Between 1996 and 2011, the total surface area of land prepared for genetically modified foods increased from 4,200,000 acres to 395,000,000 acres (see graph).

Additional Information for Teachers

Look into the background of genetic modification.
www.ornl.gov/sci/techresources/Human_Genome/elsi/gmfood.shtm/

Will Labeling Genetically Modified Foods Make a Difference?
http://6thfloor.blogs.nytimes.com/2012/10/26/will-labeling-genetically-modified-foods-make-a-difference/?ref=geneticallymodifiedfood

The Food and Drug Administration (FDA) has many aspects of health and safety to oversee.
www.fda.gov/newsevents/testimony/ucm115032.htm

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ANNOTATIONS FOR TEACHERS

Features of Academic Text: *Word Choice*

Writers of academic texts will usually choose a more precise or academic word when a more informal word could have been used. The diction, or word choice, that a writer uses will have an impact on the tone -- or attitude -- that the writer is trying to convey.

In this passage, the writer is trying to convey a neutral tone; however the writer wants the reader to take the information seriously.

Look at the highlighted words. Ask students to think of what other words could have been used. Was this the right choice? How would a different but similar word impact the way in which the reader feels about the passage?

For example:
Undernourished vs. starving.
Starving has a more emotional feeling and undernourished is more scientific.

What do canned soup, Doritos, and bacon bits have in common? They all have genetically **modified** ingredients. Seventy percent of processed foods are made with genetically modified ingredients. The **consequences** of eating genetically modified foods are unclear. Currently, companies do not have to tell consumers if they use genetically modified ingredients.

Engineers genetically modify foods to make them tastier, healthier, or easier to grow. Engineers **extract** a gene from one plant and put it into another plant's **DNA**. The plant is slightly different than before it was genetically modified. For example, engineers are able to create rice that has vitamin A and iron. The modified rice is more nutritious.

Genetic engineering can also make plants that resist harmful insects and diseases. Insects can destroy millions of crops each year. Insect damage costs millions of dollars and can cause starvation in some countries. Genetically engineering food could help feed the 800 million **undernourished** people in the world. The United Nations estimates that the world population will grow from 6 billion to 9 billion by 2050. Some say we need to use new biotechnology to produce enough food for poor countries.

However, many European countries ban or regulate genetically modified foods. Others require labels on them. Europeans are concerned about their food containing unnamed ingredients. For example, if a banana gene is added to corn, then it could cause an allergic reaction in people with rare banana allergies.

Twenty-five percent of U.S. corn is genetically modified. The United States is the largest producer of genetically modified food in the world. Many people in the United States are pressuring the Food and Drug Administration to force companies to label foods with any genetically modified ingredients. This would allow consumers to use their own discretion when buying food.

The United States Food and Drug Administration (FDA) insists that genetically modified plants are not very different from the original plants. FDA officials believe genetically modified foods are safe. The FDA requires companies to label their products only when the genetically modified ingredients contain common food allergens.

Genetically modified foods could be helpful in feeding the hungry. They could help poor countries produce more food. But do we have enough research to ensure the modified food is safe? Should the United States support the production of genetically modified food?

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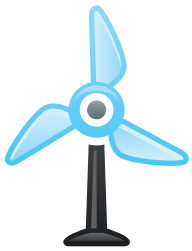


GENERATING WORDS

Root Words

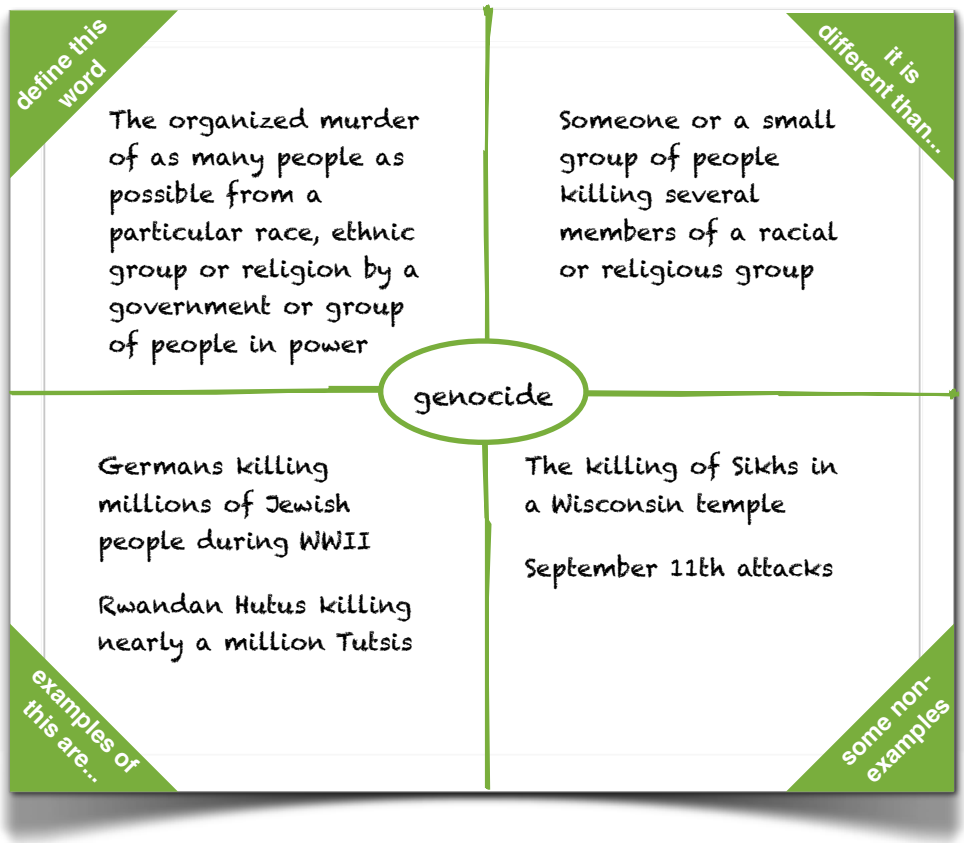
The root of a word is the base part of the word that helps you figure out what the whole word means. It gives the basic meaning. The meaning of the word can be changed by affixes.

The word **genetically** stems from the Greek root **gen** meaning birth, race or kind (of something). There are many common words that have this root.

genes	Genes are the elements from our parents that determine our genetic make-up.
genealogy	Genealogy is the history of our ancestors; where and who we came from.
generation	Generation is all the people of a particular group who were born at a similar time.
genocide	Genocide is the murder of a particular race or people. (This word is similar to homicide, the murder of a human, or suicide, the murder of one's self.)
genesis	The genesis of something is its beginning, birth, or creation.
generate	To generate something is to cause it to begin. You can generate an idea by suggesting it and allowing others to take the original idea and move forward with it.

Deepening Our Understanding

In order to understand some important words, we may need to think more deeply about what the word means. Sometimes, this includes thinking about what a word doesn't mean. Look at the example to the right.



On a separate piece of paper, create a similar graphic organizer to the one shown here. Place the word "generation" in the middle and complete the rest of the organizer.

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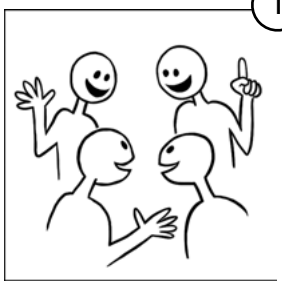
DEVELOPING DISCUSSIONS

1

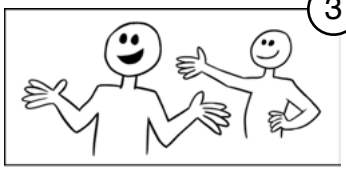


Step One: In a group of four, brainstorm as many **PRO** and **CON** arguments for the topic: *More genetically modified food.*

2

Step Two: All group members memorize the list of PROs and CONs.

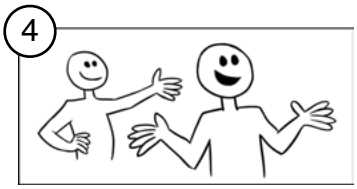
3



Step Three: Divide the groups of four into pairs and have a discussion by doing the following.

1. One partner is the "director" and the other is the "actor."
2. The director claps and says, "Debates in the classroom: **PRO!**"
3. The actor explains the PRO reasons for more genetically modified food. The actor gives a reason or two.
4. The director claps and says "**CON!**" and the actor uses a transition like "*however...,*" *"on the other hand...,"* or *"then again..."* and gives a reason or two for not supporting the production of more genetically modified food.
5. The director claps again and says "**PRO!**" and the actor uses a different transition and gives more pro reasons. Repeat.
6. When finished, the director paraphrases what he or she heard and tries to guess which side the actor is really on.

4



Step Four: Switch roles and repeat process.

What the ACTOR might say:

- ☐ One reason for producing more genetically modified foods is...
- ☐ Another reason is...
- ☐ Additionally, more genetically modified food means...
- ☐ However, or on the other hand, or then again...
- ☐ A reason to stop genetically modifying food is...
- ☐ Furthermore, we should not support the development of genetically modified foods due to...

What the DIRECTOR might say:

- ☐ Pro! or Con!
- ☐ What I heard you say is...
- ☐ I believe you said...
- ☐ Correct me if I'm wrong, but I thought I heard you say...
- ☐ Based on what I heard, I think that you really believe that...